

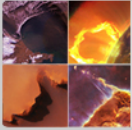


Astrophysics

Paul Hertz

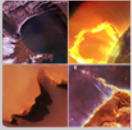
Director, Astrophysics Division, SMD

Presentation to AFTA SDT
September 19, 2013



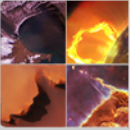
NASA use of 2.4m Telescope Assets for WFIRST

- Since Fall 2012, NASA has been studying potential uses of the 2.4m telescope assets that were made available to the Agency by the National Reconnaissance Office in mid-2012.
- The studies included both (1) whether the telescope assets could be used to realize a mission that responds to the number one recommendation of the Astrophysics Decadal Survey for a wide field infrared survey telescope (WFIRST) and (2) an assessment of possible applications to other NASA objectives in science, technology, and human space flight.
- The results of the studies were presented to the NASA Administrator and other senior officials across the Agency on May 30, 2013.
- The focused astrophysics study showed that for approximately the same costs, the telescope assets would enable a WFIRST mission with significantly improved science capabilities relative to the design described in the Astrophysics Decadal Survey.
- Use of the telescope assets would also enable the addition of an exoplanet imaging instrument to WFIRST that would enable imaging and characterization of planets around nearby stars up to a decade earlier than contemplated in the Decadal Survey.
- The Administrator directed the Science Mission Directorate to continue pre-formulation activities for a mission using the 2.4m telescope assets to prepare for a later decision as to whether a WFIRST mission would be undertaken with these optics.
- No decision on a future wide field infrared survey mission is expected until early 2016.
- There was no decision to proceed with design studies for any other concepts at this time.
- The study report by the Science Definition Team is available at: <http://wfirst.gsfc.nasa.gov/science>



AFTA SDT New Charter

- The SDT will continue the development of the AFTA Design Reference Mission, using the existing 2.4m optical telescope assets, to address the science priorities described in the Astrophysics 2010 Decadal Survey New Worlds New Horizons (NWNH) for a wide field infrared survey telescope (first priority for large-scale space activity) and the maturing of exoplanet direct imaging technology an exoplanet precursor science (first priority for medium –scale space activity).
- Study Content
 - Continue pre-formulation activities for AFTA using the 2.4m telescope for a widefield infrared survey and baseline a coronagraph instrument
 - Develop science requirements, investigation approaches, key mission parameters, and any other scientific studies needed to support the refinement and optimization of a DRM.
 - Address justification for conducting the proposed science investigations from space and an assess how such investigations will complement existing and planned domestic and international ground and space facilities
 - (Study Office) Develop cost and schedule scenarios that address both optimal build scenarios as well as other funding profiles provided; keep overall mission cost as low as possible while still achieving all or part of the science priorities; include internal coronagraph; study modularity to facilitate emerging robotic servicing capabilities



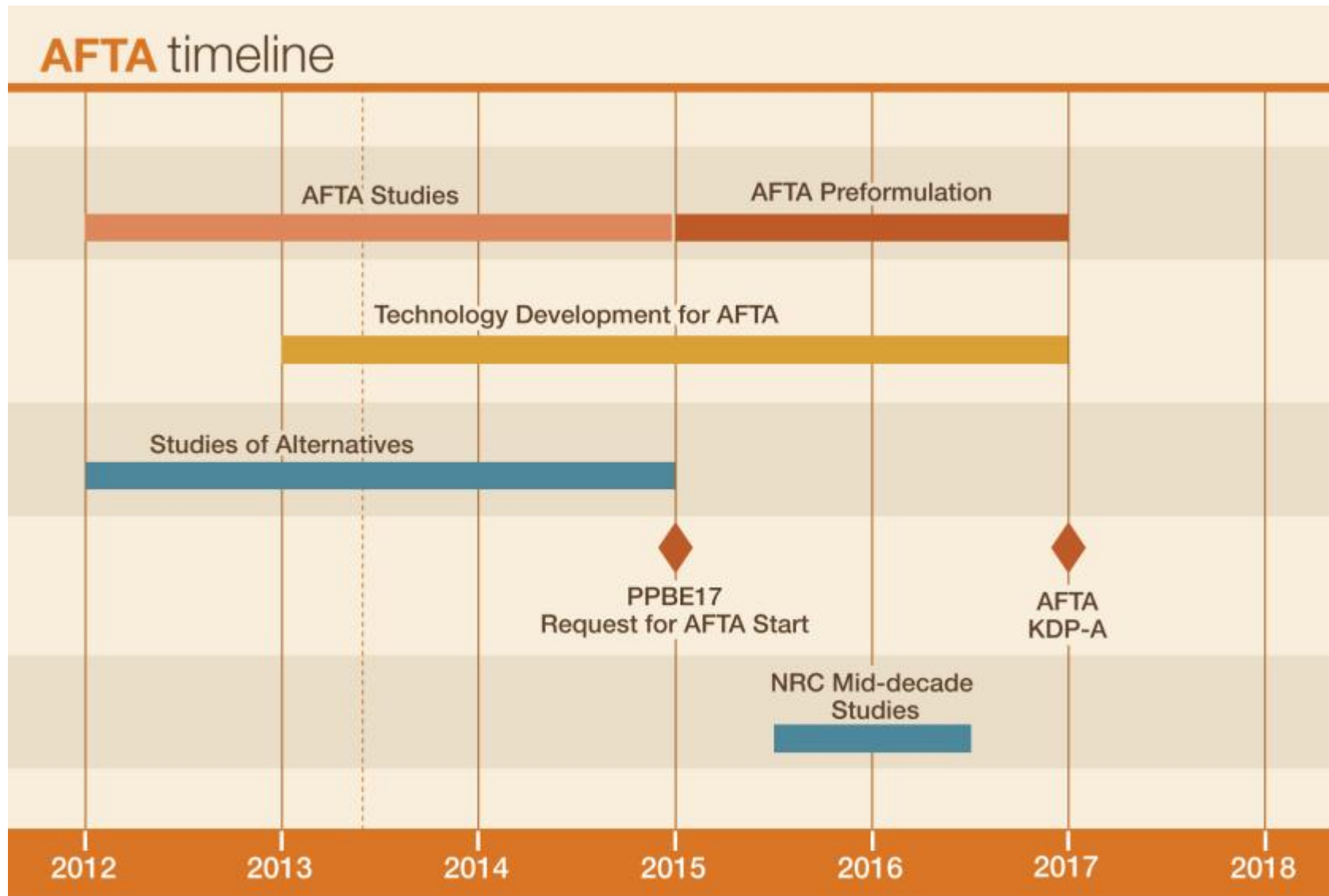
AFTA SDT New Charter

- Areas of focus
 - a) Optimization of observatory to reduce risk and minimize cost
 - b) Requirements development, refinement and flowdown, including calibration
 - c) Operations concept refinement, survey yield predictions and survey efficiency drivers, including calibration
 - d) Continuation of study of the Integral Field Unit (IFU) spectroscopy design and IFU operations concept
 - e) Maturation of the AFTA coronagraph instrument design, including a science assessment vs. performance, and a study of required observatory stability
 - f) Payload structural, thermal, and optical performance assessments
 - g) Science case versus difficulty and risk of extending the long wavelength cutoff as far as 2.4 micron
 - h) Reexamination of filter selection in light of long wavelength cutoff conclusion above
 - i) Investigation of a possible all-sky one-filter survey that could be done in 1 year
 - j) Continuation of maturing estimates of expected microlensing rates, including dynamic range requirements for microlensing.
 - k) Modifications to the telescope assets to maximize the science return with minimal costs

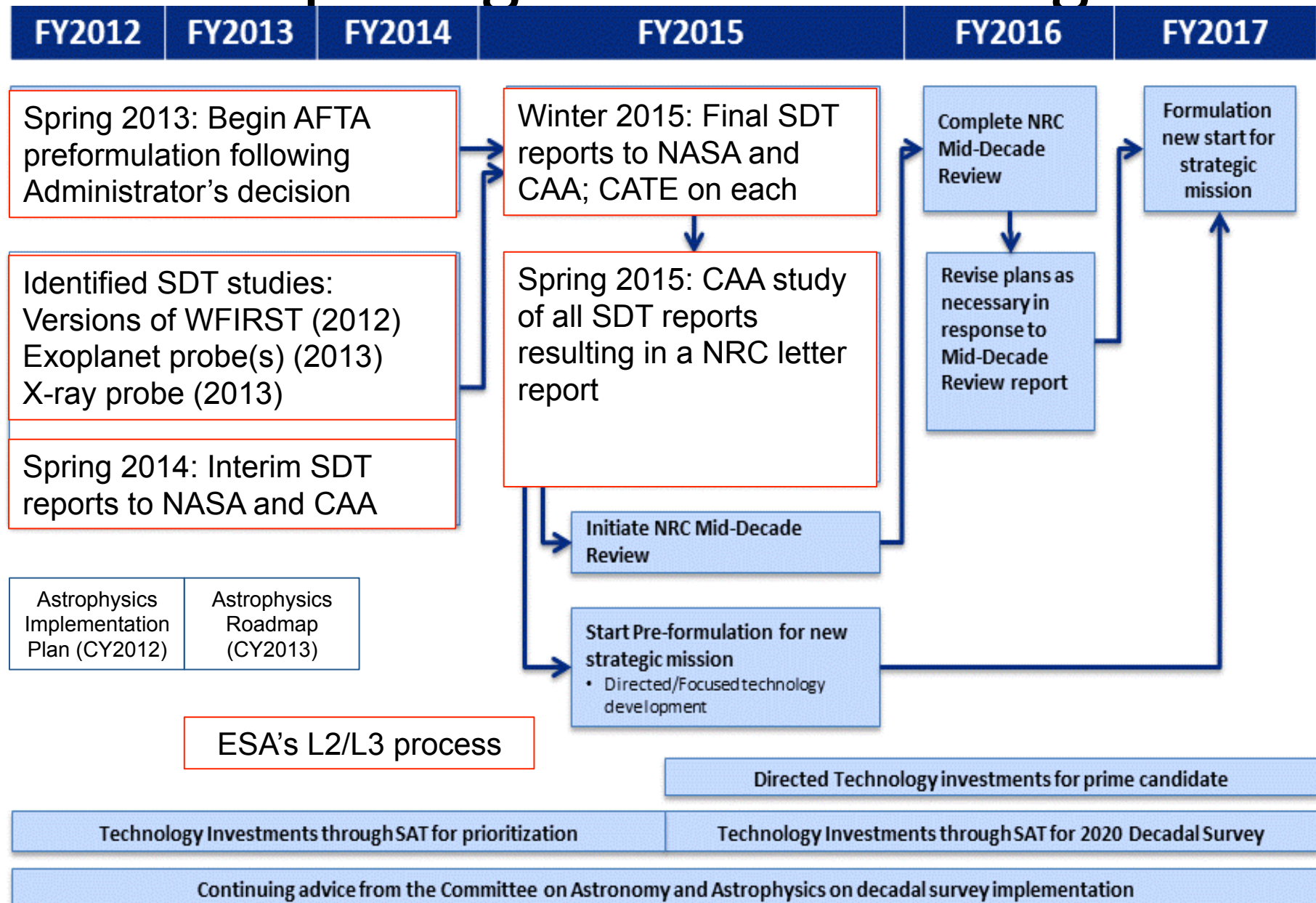
AFTA Study: Coronagraph Technology Downselect

- Downselect from 5 coronagraph architectures to 2 early in FY 14 and focus available funding to mature a coronagraph implementation by FY 2017.
- Science Drivers
 - AFTA SDT will develop baseline and threshold science drivers for a coronagraph by September 30, 2013.
- Technology Drivers
 - The current 5 TDEM internal coronagraph PIs will recommend metrics to the ExEP PO and AFTA Study Office to be used in evaluating the 5 technologies for the downselect process.
- AFTA Study Office to establish a Technology Analysis Committee (TAC) during July 2013 with input from ExEP PO.
 - The TAC will review current coronagraph technologies being funded by the ExEP PO and assess their ability to meet the AFTA DRM performance requirements and be at TRL 5 at the start of Phase A in FY 17 and TRL 6 at the start of Phase B in 2019.
- The ExEP PO and AFTA Study Office will develop a joint recommendation to APD by December 6, 2013.
- APD makes a decision by December 2013.
- Downselect to one coronagraph technology NLT beginning of Phase A.

Plan for AFTA Preformulation



Preparing the next strategic





FY13 Appropriation

- Congress appropriated \$659M for Astrophysics and \$628M for JWST.
 - Astrophysics appropriation is \$10M over FY13 PBR, earmarked for WFIRST.
 - JWST appropriation is what was requested.
 - Rescission (~1.8%), Sequester (~5%), and other budget adjustments resulted in an FY13 Astrophysics budget significantly lower.
- Astrophysics ended up at \$617M and JWST ended up at \$628M for FY13.
 - Includes \$7M for AFTA studies.
- Astrophysics made reductions totaling \$42M (6.4%) in the following areas.
 - Reduced carry-over for operating missions, includes rephasing of GO funds.
 - Rephased unneeded FY13 reserves for developing missions.
 - Rephased R&A funding until FY14 for some PIs, reduced selections.
 - Slowed down development of current and future Explorers.
 - Postponed needed upgrades in infrastructure programs.
- Downstream impacts will include.
 - Lowered R&A selection rates in 2013 (for FY14 funding).
 - Delays in future Explorer AOs.
 - Other reductions in FY14 where funding requirements were deferred.



FY13 Appropriation – R&A impacts

- Sequestration and other changes in the APD planning budget have an impact on Research and Analysis programs
 - Sequestration of funding in FY13 has been handled, in part, by making fewer selections for new awards requiring FY13 funding and by delaying funding until FY14 for those continuing PIs who indicate there is little or no impact
 - Delayed finalization of FY13 budget means some new awards cannot be started in FY13 and will be deferred to FY14
- Some specific impacts of FY13 sequestration and other known changes
 - ATP-12 and OSS-12 have fewer selections (requires FY13 funding)
 - ATP-12 and OSS-12 have some new funding starts delayed until FY14
 - TCAN-12 has all new funding starts delayed until FY14
- Some potential impacts of sequestration in FY14
 - APRA-12 will have fewer selections (requires FY14 funding)
 - ADAP-13 and OSS-13 will have fewer selections (requires FY14 funding)
 - ATP-13 will have new funding starts delayed to FY15 (reduces FY14 funding requirements)
 - RTF-13 impact TBD (unknown availability of FY14 funding)



Astrophysics FY14 Budget Request Features

What's changed (since the President's FY13 budget request in 2/12)

- A new Explorer mission (TESS) and a new Explorer Mission of Opportunity (NICER) downselected for development leading to flight.
- New Euclid project created in PCOS program to fund hardware procurement and US science team.
- Spitzer, Planck, Chandra, Fermi, XMM, Kepler, Swift, and Suzaku extended per the recommendation of the 2012 Senior Review.
- Efficiencies in Fermi mission operations implemented in FY14, ahead of schedule and resulting in a significant reduction of operating costs, plus reduced GI selections for one year.
- Budget does not support selections for the 2012 Astrophysics Explorer Mission of Opportunity AO.

What's the same

- JWST funded to maintain progress toward 2018 launch.
- Hubble, SOFIA, NuSTAR, Astro-H, ST-7, Balloons, Sounding Rockets, R&A, Archives.
- Budget for large decadal survey mission begins to grow in FY17.

NASA Astrophysics Budget:

FY07-FY13 Appropriated, FY14 Proposed, FY15-FY18 Notional
(FY13 estimated awaiting op plan)

Real Year \$Million

JWST Program

Rest of Astrophysics

- Managed by JWST Program Off
- Managed by Astrophysics Div
- Total Astrophysics

FY04 FY05 FY06 FY07 FY08 FY09 FY10 FY11 FY12 FY13 FY14 FY15 FY16 FY17

0

200

400

600

800

1,000

1,200

1,400

1,600

Astrophysics Missions timeline

Last updated: April 15, 2013

